time circles, where experience over a wider territory is had, these observed conditions have been supplemented with barometric observations.

Local signs and observations, however, rarely indicate the duration and intensity of threatened atmospheric disturbances save in the immediate presence of a storm, and barometric readings are ofttimes misleading, unless considered in connection with the readings taken at points remote from the place of observation.

By the modern system of weather services reports of local observations are collected by telegraph, collated, and charted, and the forecaster has for his consideration not only the signs and conditions noted in the various localities, but also a general graphic presentation of atmospheric conditions over the entire region covered by the stations of observation.

Without at this time considering original causes the unequal air distribution over the surface of the earth may be recognized in the areas of high and low barometer which appear on the weather map. These areas of high and low barometer have a progressive movement, which in the middle latitudes is from west to east at an average rate of 20 to 40 miles an hour. The high areas are usually attended by settled, fair, and seasonably cool weather, and the low areas by unsettled, stormy, and warm weather. The weather maps show that the low areas are vast atmospheric whirls or eddies with the wind blowing spirally and contra-clock wise, inward toward the center of the whirl, where the lowest barometer is found. The areas of high pressure show winds blowing spirally outward from the center of highest barometer, the circling movement being in a direction contrary to that observed within the areas of low barometer. A consideration of the progressive and circling movements of the high and low areas will reveal the causes which produce local weather signs and conditions.

In weather calculations the barometer is the pulse, and the wind is the breath of storms, and the thermometer registers the variation of the vital function heat. A consideration of these elements, or symptoms, in their various phases constitutes a diagnosis by means of which weather changes of the near future may, as a rule, be approximately determined. Rapid oscillations or changes in the barometer indicate early and marked changes in the weather. When barometric changes of this character occur during fair weather, and are downward, and the wind and temperature respond and cooperate in accordance with recognized rules and laws, foul weather may be expected; when the barometer has a decided upward inclination, and is supported by certain winds and thermal conditions, fair weather, or a return to fair weather, is indicated.

The contents of the table herewith are a key for the determination of weather changes indicated by the barometer and the direction and shifts of the wind. In sections of the United States named at the head of the table the advance of an area of low barometer, or a general storm area, is indicated by the wind going to points between south and east, and when the storm center is approaching from the southwest the winds will change to east or northeast. This shift of wind, if accompanied by falling barometer, will be attended by increasing cloudiness, and the southerly winds will bring the warmth of lower latitudes; and, as warm air has a greater capacity for moisture than cool air, the amount of moisture in the atmosphere will increase. The amount and rapidity of the fall in the barometer will usually indicate the nearness and intensity of the approaching storm. When the center of the low barometer has passed over a given locality the barometer will begin to rise, the wind, still blowing and circulating toward the center of the atmospheric whirl, will shift to west and northwest, the temperature, brought from colder latitudes by the winds west of the center, will be lower, and the weather will clear under the influence of an area of high pressure, which always follows in the wake of an area of low atmospheric pressure.

NOTES BY THE EDITOR.

WEATHER TELEGRAPHY IN ENGLAND AND AMERICA.

It is well known that the first weather maps for the United States, as compiled daily by means of telegraphic reports, were made by the Smithsonian Institution. In 1843 Espy had been engaged by the United States Government as meteorologist; he was assigned to duty, at first under the Surgeon-General of the Army, afterwards, to the Secretary of the Navy and, finally, 1848, under the Secretary of the Smithsonian. During the first years of his work he compiled many daily maps from the monthly returns of the meteorological observers scattered over the country, and he published a liberal selection in his four successive meteorological reports. In 1847 Professor Henry began to devote special attention to this subject, and, during the subsequent years, in cooperation with Professor Espy, the Smithsonian system of observers was largely extended, special investigations were made, the telegraph offices were supplied with instruments and reports secured for the compilation of daily maps; the prediction of storms was definitely proposed as the ultimate object of the work in hand. The telegraphic reports seem to have begun in 1849, at least experimental maps were then made for July 19th and 20th for Professor Henry by Dr. A. Jones, in New York, and sent to Washington as samples. Dr. Jones wished to have New York made the central collecting point.

Simultaneously with the work of Espy and Henry and their colaborers, Redfield, Loomis, Coffin, and Guyot, a similar development was going on in England. The electric telegraph company (using Wheatstone's system) had been incorporated in England in 1846, and by 1851 it had erected about 2,000 miles of wire. At the first great World's Fair, at the Crystal Palace near London, in 1851, weather reports were received by telegraph from many points and a daily weather map published by lithography, beginning with August 8, 1851. A facsimile of this map is reproduced in Symons' Monthly Meteorological Magazine, September, 1896.

The last number of Symons' magazine (April, 1897) contains further interesting information with regard to similar work in 1849 and 1850. Just before receiving that number of this magazine, the present Editor had discovered and copied the following interesting letter from Mr. James Glaisher which has been, fortunately, preserved among the fragments of correspondence saved from the destruction of the records of the Smithsonian at the disastrous fire of January, 1865. These records are now accessible to the student, and the letter here reprinted, taken in connection with the important and authoritative sketch published by Mr. Symons, shows that Mr. James Glaisher, the nestor of meteorologists, who is still living at an advanced age in London, was, so far as we know, the first to organize a system of strictly simultaneous observations and to compile the corresponding daily bulletins and weather maps. According to Mr. Symons, Glaisher's first map was that for June 14, 1849, or five weeks before that of Dr. Jones in New York. He does not appear to have utilized the expensive assistance of the electric telegraph, but by the cooperation of the railroad companies, and at the expense of the proprietors of the Daily News he was

able to gather together every night the meteorological observations made at 9 a. m. (Greenwich time) and publish his *bulletin* in the next morning's paper. The *map* was not published but was compiled and studied by himself individually. The similar work done in this country, the history of which has often been rehearsed, was evidently as little known to Glaisher as was his own work in America. It is but another and a most striking illustration of the simultaneous origin of many of the important discoveries and inventions that mark the progress of the human race throughout the world.

Regretting that we are not able to print the letter written by Professor Henry on June 5, we think ourselves fortunate in submitting the following reply by Mr. Glaisher:

13 DARTMOUTH TERRACE, BLACKHEATH, KENT,
July 8, 1850.

MY DEAR SIR: In reply to your letter of June 5 I beg to say that I shall have great pleasure in sending you copies of the forms I use in collecting meteorological observations, and the results of my experience are entirely at your service. In your letter you have not indicated the channel through which you wish the papers to be sent, and, therefore, I shall forward them through the Royal Society.

With the papers I shall send you will find a few copies of an address of a new Society, which myself with a few gentlemen have formed. It is under the presidency of J. C. Whitbread, esq.

At the meeting of the council of this Society, held a few days since, I did myself the pleasure of reading the letter with which you have favored me, and it was resolved that a form for collecting observations, drawn up by myself, and now in the printer's hands, should be sent to you, and the council expressed a wish to cooperate with the Smithsonian Institution as far as possible. Hitherto, there has been no fund devoted to meteorology in England, and I have borne all the expenses, excepting that each gentleman has furnished himself with his instruments; government, however, has published the results in the reports of the Registrar General, some of which I send.

We hope now to collect much more information than I have hitherto done, and if the system adopted by you be similar to that adopted by us, their united results will be more valuable.

Among the forms sent you will find one very simple, and which is used daily at about 50 different railway stations at the hour of 9 a. m., Greenwich time. The different railway companies have agreed that the station masters shall take these observations, and that they shall be brought to London the same day, free of expense. The proprietors of a London newspaper, The Daily News, incur the expense of sending a messenger to the several railway termini at about 2 a. m., and all the returns thus collected are immediately printed, so that the weather of the day previous, at one time, all over the country and parts of Scotland are publicly known. On receiving the paper I lay all these returns on a map, using a long, narrow-headed arrow to indicate the direction of the wind, and other symbols for the other information, and thus daily I know the weather, direction of the wind, etc., the whole being exhibited to the eye. Several gentlemen, whose names you will see in a form headed "simultaneous observations taken at 9 a. m.," have agreed to cooperate with me, and to take all the observations taken by the railway station masters, as well as others, with their full sets of instruments. It is believed by these arrangements, that very important information, with respect to the passage of storms in particular, will thus be collected. I have already more than one year's observations and daily maps in an unbroken series.

Previous to commencing these observations I visited every station, determined its meridian, fixed a compass card, and instructed the station master, remaining with him till I felt certain he would take the observations well.

The method I have adopted with respect to the observations of general phenomena is first to superintend the making of the instruments, then their selection. I determine their index errors by carefully examining and comparing every instrument with a standard. I visit the different locations in which they are placed, and examine the positions of the instruments themselves.

On receiving the returns I first examine every one by itself; second, I divide them into groups, including the observations from one known good observer, and then I compare every result in every return with the corresponding result in the standard return, taking into account difference of elevation, etc.; next I form groups according to latitude, and another according to the longitude, by these means I usually detect any errors, and I believe very few escape. After this I proceed to their combinations, etc.

In future the British Meteorological Society intends having monthly returns, including every observation, and for which a form is now being set up, I shall, therefore, be more certain of the accuracy of the results.

I should be glad to have some arrangements made with the captains of steam vessels between America and England, thus connecting the observations taken in both countries, and I think this may ultimately be done.

I have the honor to be, Sir, with much respect and esteem,
Yours, very truly,

JAMES GLAISHER.

CAPTAIN DANSEY'S KITE FOR STRANDED VESSELS.

In the Transactions of the Society of Arts, Manufactures, and Commerce for 1825 a proposition was published which at the time received wide circulation, and which we recopy from the American Journal of Science and Arts for February, 1826, Vol. X, p. 184:

Captain Dansey, of the British Royal Artillery, proposes the employment of a kite to facilitate "communication with vessels stranded on a lee shore, or under other circumstances where badness of weather renders the ordinary means impracticable. A sail of light canvas or holland (being cut to the shape and adapted for the application of the principles of the flying kite) is launched from the vessel or other point to windward of the space over which a communication is required, and as soon as it appears to be at a sufficient distance a very simple and efficacious mechanical apparatus is used to destroy its poise, causing it to fall immediately, but remaining still attached by the line and moored by a small anchor, with which it is equipped." One end of the rope being thus conveyed to the shore and fixed by this small anchor, some one of the hands is enabled to get on shore and render assistance to others. The importance of the object is sufficient to recommend every expedient for its accomplishment. Captain Dansey is particular to recommend certain proportions for the construction of the kite. The canvas or holland is extended upon two spars whose lengths are to each other as two to three, the crosspiece intersecting the standard so that the upper section of the standard shall be to the lower section as one to two. At two points on the standard, about one-seventh of its length from the head and the same from the bottom, two lines are attached, the upper about one-sixth of the length of the kite and the lower two-thirds of its length, which combined form the bellyband, and to their point of junction is attached the line which is to retain the kite. The tail may be five or six times the length of the kite and its weight must be proportionate to the wind.

To effect the descent of the kite, the end of the line retained in the vessel is slipped through an apparatus, called the *messenger*, which, having a sail attached to it, is immediately taken up by the wind along the line toward the kite. This messenger, by driving out a wedge, which is essential for the proper poise of the kite, so transfers the center of suspension that a rapid descent of the kite and apparatus attached is a necessary consequence. Some experiments made with this instrument have given Captain Dansey much confidence in the success of his invention.

KERKAM'S KITES WITH ROCKET SIGNALS.

The military authorities of the world have developed several methods of utilizing the kite, as, for example, to raise on high an observer who wishes to overlook the neighboring country, or to elevate a string of signal flags, by means of which to communicate with distant friends. In the Louisiana Climates and Crops for July, 1896, Mr. R. E. Kerkam, the section director at New Orleans, says:

Three of the kites described in the MONTHLY WEATHER REVIEW for November, 1895, have been constructed here, two 44 inches high and one 88 inches high, the object of the latter being to find the lifting power and whether a system of rocket signals could not be fired therefrom at an elevation of about half a mile, using a time fuse for the firings. The Louisiana coast has no telegraph or telephone lines east or west of Port Eads, and the inhabitants are mostly ignorant fishermen, who will not take steps to repeat signals from one point to another. By a system of rocket signals, fired from the nearest towns to the coast, the rockets could be seen a long distance.

THE USE OF THE SEARCH LIGHT IN METEOROLOGY.

It was in December, 1872, that the Editor recommended to General Myer an easy method of determining the heights of clouds, and especially of the ill-defined stratus cloud. It was proposed to establish a search light whose beams should be vertical; the apparent altitude of the center of the luminous spot of the cloud was to be observed from a station not far away and the height was a matter of easy calculation. Since that time, and with the great increase in the power of the modern search light, further applications have become practicable; thus in harbors on the seacoast, where one wishes to ascertain the presence and development of low-lying fogs, the